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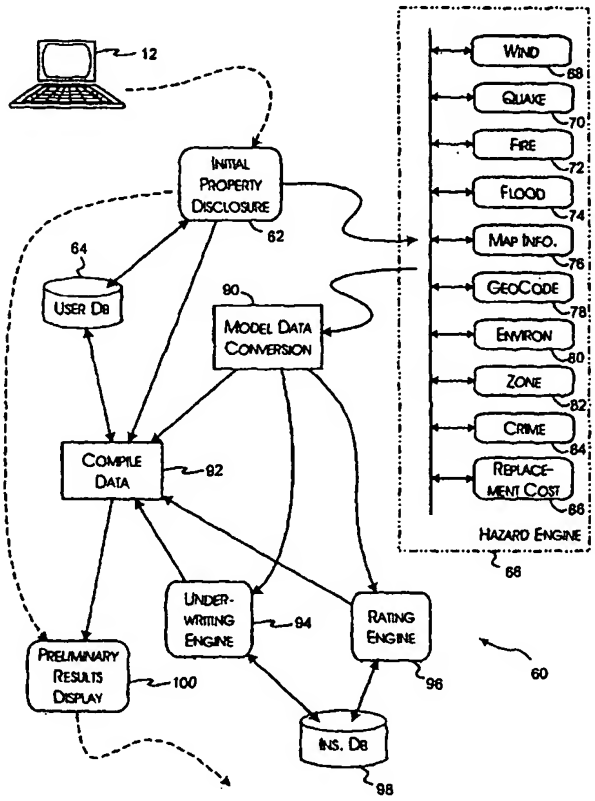
(54) Title: COMPREHENSIVE RISK ASSESSMENT SYSTEM AND AUTONOMOUS METHODS OF INSURANCE UNDERWRITING UTILIZING SAME



(57) Abstract: The system, executable by a general purpose computer, includes a plurality of risk-modeling software engines, a model data conversion engine, and a rating evaluation engine. Risk-modeling software engines provide for the evaluation of respective property loss risk factors to generate model result data based on a site-specific description of a predetermined property. The model data conversion engine stores a plurality of insurability profiles that define respective sets of predetermined loss risk-factor base criteria, with each of the insurability profiles corresponding to an insurance source. The model data conversion engine is coupled to receive the model result data and is operative to select a qualified insurance source by providing for the adaptive conversion and comparison of the model result data against the sets of predetermined loss risk-factor base criteria to select a predetermined insurance source. The rating evaluation engine, coupled to receive the model result data and the predetermined insurance source, autonomously generates a site-specific insurability rating for the predetermined property based on the model result data.

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COMPREHENSIVE RISK ASSESSMENT SYSTEM AND AUTONOMOUS METHODS OF INSURANCE UNDERWRITING UTILIZING SAME

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Background of the Invention

Field of the Invention:

The present invention is generally related to risk assessment systems used in the evaluation of insurable loss exposures and, in particular, to a comprehensive-risk analysis system capable of autonomous generation of loss exposure based ratings that are site-specific.

Description of the Related Art:

Insurance of individual properties, specifically including real-properties and the structures built on those properties, is widely systematized through cooperative arrangements between agents, property inspectors, brokers, underwriters, and others. Although these parties provide many different essential services in the securing and subsequent performance of an insurance contract, which can be quite variable depending on the circumstances of any particular loss event, the overall process of determining and securing the underwriting of an insurance contract is relatively constant.

An agent for a particular insurance carrier or group of carriers evaluates a property and structure for insurability based on threshold criteria established by a carrier. These threshold criteria typically involve rather cursory evaluations of basic discriminating factors, such as size, zoning, and location with a known exposure to a natural disaster hazard, as well as age, type of construction, and valuation. Where a property meets or fits within these criteria for insurability, some greater evaluation of the probable maximum loss ("PML") is performed to determine an insurance rating, and therefore premiums to be charged, for insuring a particular property by the selected carrier. Determining the PML for a property is conventionally treated as an evaluation of the costs likely to be incurred in response to a particular loss event. For example, this valuation is typically determined simply as the replacement cost of restoring a property in the event of a flood or rebuilding a structure following a fire. An insurance rating is then determined based on an actuarial analysis of the likelihood of any particular loss event.

Computerization of the underwriting process has been employed in a number of different ways. Various programs have been developed to automate the application process. Agents have been able to collect property related information through screening of externally available information into an electronic application form. Thus, the threshold criteria determined by a carrier or group of carriers directly identifies the information to be collected by the agent in initiating the underwriting process.

Other programs have been developed to assist in the determination of whether any particular property is exposed to a natural disaster hazard. Given a property addresses, typically once converted to latitude and longitude coordinates, computer systems can evaluate public or commercially available proprietary topographical map databases to determine if the property is within

a defined natural hazard risk area. Conventional map databases are known to exist for flood, earthquake, tornado, and other natural disaster risks.

Databases, containing zoning and other building related information, are also known to exist. In some instances, these databases are developed and made publically accessible by the governmental agencies responsible for collecting and disseminating the corresponding information. Typically more extensively informed proprietary databases of zoning and building related data also exist and are commercially accessible.

The different programs used to access and evaluate the information contained in these public and proprietary databases are typically dedicated to the analysis of the corresponding type of retrieved data. Even as between different databases providing similar information, the scope and detail of the information produced from these databases conventionally makes any form of evaluation rather specialized.

Conversely, however, the sophistication of the various carriers in establishing their basic insurability criteria is rather low compared to the level of information that might be obtained from the detailed analysis of one or more different databases. This is, at least in part, due to the well-recognized complexity of even trying to significantly analyze available topographical data particularly due to the inherent complexity of its presentation from different databases. Another factor is that the insurance against potential future losses is inherently a statistical analysis of risk events.

The significance of evaluating any particular risk is further distanced by the pooling of insurance underwriting. The details of any particular loss is of little consequence in comparison to the overall or averaged risk exposure of a large insurance pool. Indeed, complex systems of analysis exist to evaluate the portfolio risk exposure of insurance pools to particular loss events. Management of risk exposure at this level, though significant computerization

and detailed analysis is often utilized, occurs independent of the location of any particular insured property.

Consequently, there is a need for a system capable of autonomous operation that is able to effectively provide a comprehensive risk-analysis suitable for identifying qualifying underwriters of insurance and generating an insurability rating for a specific property and attendant structures.

Summary of the Invention

Thus, a general purpose of the present invention is to provide a comprehensive risk-assessment system supporting the identification, qualification, and rating for a particular property that is fully capable of autonomous operation.

This is achieved in the present invention by providing a system, executable by a general purpose computer, that includes a plurality of risk-modeling software engines, a model data conversion engine, and a rating evaluation engine. Risk-modeling software engines provide for the evaluation of respective property loss risk factors to generate model result data based on a site-specific description of a predetermined property. The model data conversion engine stores a plurality of insurability profiles that define respective sets of predetermined loss risk-factor base criteria, with each of the insurability profiles corresponding to an insurance source. The model data conversion engine is coupled to receive the model result data and is operative to select a qualified insurance source by providing for the adaptive conversion and comparison of the model result data against the sets of predetermined loss risk-factor base criteria to select a predetermined insurance source. The rating evaluation engine, coupled to receive the model result data and the predetermined insurance source, then autonomously generates a site-specific

insurability rating for the predetermined property based on the model result data.

An advantage of the present invention is that comprehensive, site-specific risk assessments of the potential damages incurred by a property can be autonomously generated. The risk assessments are of a quality and nature that insurance protection for these potential damages may also be autonomously secured.

Another advantage of the present invention is that it manages underwriting profiles and autonomously provides for the selective mapping of the risk assessment data to these underwriting profiles to identify and fully qualify a specific property for insurance by a particular insurance carrier.

A further advantage of the present invention is that the present invention provides for the autonomous interpretation of the generated risk assessment data in order to determine whether the threshold acceptability criteria of a particular underwriting profile, having some particular if not unique qualification requirement, is met.

Still another advantage of the present invention is that the quality and nature of the risk assessment data supports multiple levels of refinements to the acceptability criteria, permitting carriers to offer their underwriting services based on different and better risk assessments of the potential loss associated with a particular property.

Yet another advantage of the present invention is that the risk assessment data is generated and fully valid on a site-specific basis. The risk assessment data generated for individual hazards is actuarially valid within a statistical scope that is defined by a specific property and the nature of the hazard. Consequently, dependencies between or shared in the modeling of individual hazards does not change the validity of the risk assessment data produced.

Still another advantage of the present invention is that the risk assessment data provided by multiple, independent hazards models can be collectively processed to generate fully integrated risk assessment data that reflects the potential combined loss and damage factors that define the exposures of a particular property.

A yet further advantage of the present invention is that utilization of the system implementing the present invention allows identification and selection of the most cost-efficient and protections-appropriate insurance coverages for a specific property. Changes in the underwriting profiles and in any of the underwriting ratings can be autonomously detected and used to initiate or re-initiate the ranked selection of underwriting profiles for a specific property. Upon notification, the insurance beneficiary of a property can perform an essentially, if not actual, one-click acceptance and binding of a new or revised insurance contract.

Brief Description of the Drawings

These and other advantages and features of the present invention will become better understood upon consideration of the following detailed description of the invention when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof, and wherein:

Figure 1 illustrates multiple different systems for performing property risk analysis and underwriting, including a system implementing a preferred embodiment of the present invention;

Figure 2 shows an initial, site-specific hazards risk analysis and presentation system for a preferred embodiment of the present invention;

Figure 3 shows a detailed, site-specific hazards risk analysis, presentation and underwriting system for a preferred embodiment of the present invention

Figure 4 provides a detailed view of the system and process of developing detailed, site-specific hazards risk analyses convertible to underwriter specific property assessment profiles;

Figure 5 provides a detailed view of the system and process of developing ratings data based on site-specific underwriting parameters; and

Figure 6 shows a process of binding an underwritten risk protection policy based on a site specific analysis of property hazards.

Detailed Description of the Invention

For the preferred embodiment, the present invention provides for the comprehensive assessment of risks for a defined property and attendant structures in connection with the selection of an insurance carrier and the binding of insurance for the defined property. The autonomous operation and comprehensive function of the present invention allows an ordinary individual client-user to access the implementing computer system, identify a potentially insurable property, and obtain an initial evaluation of the risk factors that may or will affect the insurability determination and insurance rating of the property. The invention further permits and supports the election to automatically select one or more qualifying underwriters and develop the corresponding insurance ratings for the property for consideration by the client-user. Finally, the present invention enables the client-user to qualify for and fully bind an insurance contract against any carrier selected by the client-user.

As generally illustrated in Figure 1, a number of systems 10 may be accessed by a client-user computer system 12 through a communications

network 14. This network 14 may be a proprietary wide-area or point-to-point connection and, preferably in relation to the preferred embodiment of the present invention, is a secure network connection established over the Internet 14 or other similar public wide-area network.

In the case of a proprietary underwriting system 16, the client-user is typically an agent or broker. This client-user operates, directly or indirectly, a computer system 18 to execute a proprietary software application 20 to collect specific information required by a specific insurance carrier. A private database 22 is typically used in connection with the application 20 to screen against a proprietary set of risk factors before accepting an application for insurance. The agent/broker must not only provide the specific information required by the application in the specific form and format required, the system 16 is typically capable of only providing a print-out of the qualified insurance application. The services of the agent/broker are still required in order to complete the underwriting process.

Other prior art computer systems, such as the computer system 24 directly support the process of actually binding the insurance contract. A computer system 26 executes a proprietary application 28 that again operates against a private database 30 to support the preparation of an electronic application for insurance. As before, the application 28 requires the specific property-related information to be supplied in a specific form and format. As a qualified processing system employed by or on behalf of a particular carrier or group of carriers, the informational requirements of the application 28 are predefined. The application is therefore unable to accept property information that is in a form or format that is any different from that defined by the application 28. Nonetheless, where the required information can be provided in an acceptable form, and that information meets the requirements of the insurance carrier – that the property is insurable – the application 28 is then

capable of operating 32 as a binding agent by identifying a corresponding insurance rating and, if accepted, committing the binding of the insurance contract 34.

The system 24 is not, however, autonomous. The client-user is conventionally required to be an agent or broker in order to interface with or operate the system 24. This high level of sophistication is required to ensure that appropriate information be collected and provided to the system 24 as necessary to meet the rigid data requirements of the application 28.

The present invention, as represented in the system 36, includes a computer 38, preferably configured as a Web server, that executes an application 40 that autonomously functions to implement a comprehensive risk assessment system capable of evaluating potentially insurable risks in regard to an identified property. The application 40 is preferably a combination of programs including an HTTP server, a set of modeling engines, and servlets that operate to establish access to local and external databases 42, 44, 46, to communicate with various binding authorities 48 capable of securing 50 payments and to overall integrate these programs into the application 40. Since the operation of the application 40 is autonomous, as enabled by the present invention, there are no significant restrictions or requirements placed on the client-user. Thus, a conventional Web enabled client computer system 12 with access through the Internet 14 is sufficient to fully utilize the system 36.

Referring now to Figure 2, the preferred implementing process of the present invention provides for an initial analysis of the risks, potential for insurability, and likely insurance rating of an identified property. This process is preferably implemented through the execution of the application 40 by the computer system 38. Through an initial property disclosure interaction 62, a client-user 12 preferably provides an identification of a property by entry of a fully qualified address, the type of structure to be insured, such as house,

condominium, or apartment, the size of the structure, preferably in terms of square footage, the age of the structure, and the structural foundation type. Some unique identification of the client-user is also obtained. Based on this information, a client-user record is created and stored in a user database 64 that is proprietary to the system 38. The collected information is then provided to a hazards evaluation engine 66.

In a preferred embodiment of the present invention, the hazards evaluation engine 66 may include any number of different specialized risk modeling engines 68-86. These individual engines 68-86 are preferably implemented as software components with well-defined data input requirements and produce equally well defined sets of risk data. The particular features and content of the risk data produced by any particular engine 68-86 is highly dependant on the nature and operation of the particular software engine.

The individual engines 68-86 can be generally categorized as those that operate to model the risk exposure to specific loss events (Loss Event), those that support the operation of the risk specific models (Support), and those that provide additional information used to qualify the risk assessments provided by the risk specific models (Qualification). Table I summarizes a preferred set of the software engines 68-86.

Table I – Hazard Engine Components

	Model	Primary Model Parameters	Type
1.	Wind	Frequency, nature, severity of tornados, hurricanes, and other wind driven damages.	Loss Event
2.	Quake	Frequency, nature, severity of earthquakes.	Loss Event

	Model	Primary Model Parameters	Type
3.	Fire	Frequency, nature, severity of fires due to human and natural causes; exposure to fires spread from surrounding property.	Loss Event
4.	Flood	Frequency, nature, severity of floods and other damages due to water on the land surface; proximity to flood plain, dams, other water channels.	Loss Event
5.	Map Information	Topographical information based on coordinates; hazard zones.	Support
6.	Geographic Coding	Conversion of property address to property boundaries to coordinates.	Support
7.	Environment	Nature and proximity of environmental hazards.	Qualification
8.	Zone	Industrial, commercial, residential, other; construction density; composition of structures.	Qualification
9.	Crime	Frequency, nature, severity of incidents and impact to structure and occupants.	Qualification
10.	Replacement Costs	Cost valuation based on zoning and structural construction requirements	Qualification

In a preferred embodiment of the present invention, the initial property disclosure information is processed through the geographic coding engine to identify the property in an unambiguous coordinate system. This siting information, along with the available information describing the structure located at that site, is then provided directly to the loss event engines as discrete input data. That is, the siting information is specifically not aggregated by value, geographic rating area, zone or other general qualification factors. The siting information is similarly provided discretely to

the qualification engines. The information generated by the qualification engines is therefore based on or determined relative to the specific site and structure being analyzed.

The loss event engines initialize their software models using the siting and structure data. Additional input data is obtained, as needed, from the qualification engines. Other data that is used in the modeling operation is stored in databases dedicated to the particular engines. For example, the quake engine 70 preferably locates the site relative to known faults and models out the likely frequency and severity of particular fault ruptures. As part of this analysis, the quake engine 70 relies on information obtained from the map information engine 76 to physically locate known faults relative to the target site and to determine distances between the target site and specific faults. For example, the map information engine 76 may provide data identifying the Alquist-Priolo fault hazard zones, which can be used to simply determine whether the target site is inside a known fault rupture area.

Other data directly accessible by the quake engine 70 includes soils data and data describing geologic formations that may exist at the target site and near faults. This other data is preferably used to determine the geologic nature of the site, such as the underlying soil type and responsiveness to earthquake motions, and the earth materials that extend between the target site and different selected faults, which may amplify the shaking level experienced at the target site in response to any particular event.

The quake engine is thus capable of providing a wide range of detailed output information specifically concerning the target site. This information preferably includes: (1) the soil type at the target site; (2) distance from the site to the closest known fault; (3) name of that closest fault; (4) distance from the site to the closest known controlling fault, which is the fault that presents the greatest threat of damage to the target property, (5) magnitude of largest

event expected on the controlling fault within a defined period of time; (6) the mean shaking level at the target site expected in response to an event on the controlling fault; (7) multiple statistics on the expected damage level that will be incurred by the structure on the target site in response to an event on the controlling fault; (8) multiple statistics on the probabilistic damage level for that will be incurred by the structure on the target site as a result of all events on all known faults; and (9) the distance from the target site, fault name, magnitude of the largest expected event, and the shaking level at the site from the largest expected event for each of the ten closest faults. In a similar manner, each of the individual hazard engines 68-86 operate on the basis of a particular coordinate location of a particular property. The site-specific nature of the information used by any of the engines 68-86 and, in turn, finally generated by at least the loss event engines 68-74 is maintained through out the operation of the hazard engine 66.

The detailed and site-specific information produced by the hazard engine 66 of the present invention is processed through a model data conversion engine 90. This engine 90 operates initially to process the data generated by the hazard engine 66 into a compiled data set 92 that can then be evaluated by an underwriting engine 94 and a rating engine 96. This compiled data set 92 is also preferably stored in the user database 64 for subsequent reference in connection with the client-user record.

In the preferred embodiment of the present invention, the underwriting engine 94 stores and operates over a set of underwriting profiles that establish the base criteria of different carriers for the issuance of particular insurance policies. The model data conversion engine 90 interoperates with the underwriting engine 94 to match and filter the detailed data produced by the hazard engine 66 to produce data sets whose information maps to the particular criteria of the underwriting profiles. Thus, where a particular profile

criterion could not be directly resolved by reference to the detailed information generated by the hazard engine 66, in accordance with the present invention, a matched and filtered data set contains the relevant data in a form that can be directly evaluated against the profile criteria. For example, a particular carrier's insurability profile criteria may require that the target property not be subject to a shaking level of greater than a specific value on a defined earthquake shaking scale, such as perhaps 8.5 on the Modified Mercalli Intensity (MMI) scale. The criteria may also require that any structure on the property have a "Grade-Y" rating, in the carrier's defined terminology, reflecting a likely level of damage at the threshold shaking level.

In a preferred embodiment of the present invention, the quake engine 70 may directly produce a shaking level value using the same shaking scale specified in the insurability profile. Other shaking level values on other scales may also be produced for potential use in regard to other profiles. Also, the quake engine 70 may generate one or more different characterizations of the percentage likely damage for the structure.

While a direct correspondence between the shaking criteria of the insurance profile and the data produced by the quake engine 70 exists, no direct data correspondence exists for determining whether the structure meets the "Grade-Y" rating profile requirement. The model data conversion engine 90, in accordance with the present invention, not only identifies the particular shaking data that is to be considered against the insurability profile, but also provides for an acceptable conversion between an appropriate, or closest comparable, percentage damage characterization produced by the quake engine 70 and the carrier's particularly defined damage rating scale. Depending on the complexity of the conversion, the definition of the conversion for any particular carrier may be implemented as a simple business

rule or a complex expert system process, operating from a database 98 of conversion rules and data, defined in regard to particular carriers.

With the production of the matched and filter data sets by the model data conversion engine 90, the underwriting engine 94 performs a series of insurability criteria profile comparisons to identify any qualifying carriers. The identification of the qualified carriers and the data sets are then provided to a rating engine 96. Based on the data sets, the proposed insurance premiums for the different carriers are produced. This production, at this point in the operation of a preferred embodiment of the present invention, is of estimated premiums, since the information provided by the user in the initial property disclosure 62 is generally insufficient to fully describe the property and structure that is proposed for insurance.

The qualifying carriers and the proposed premiums are compiled together 92 with summary explanations of the hazards identified through the execution of the hazard engine 66. This compiled information is then preferably presented to the client-user as a preliminary results display 100.

The risk assessment of a given property, including the evaluation of the potential insurability and rating of the property, as described to this point is preferably presented as a free pubic service accessible over the Internet 14 to any client-user 12. A continuation of that process, as generally illustrated in Figure 3, is preferably subject to the payment of a fee for the development of a comprehensive risk assessment and presentation of a formal quote for insurance. The requirement of a fee is, however, not essential, but rather merely preferred as a method of covering the cost of third-party services desired or required by insurance carriers in order to complete an application for insurance. This fee is preferably waived where a qualified application for insurance is submitted for binding.

If the client-user indicates, from the preliminary results display 100, that a formal quote for insurance coverage is desired, the client-user is presented with a detailed property disclosure screen 112. The client-user is directed to enter, in the preferred embodiment of the present invention, a full identification of the client-user, at least sufficient to enable an electronic funds transfer to cover the fee, and a detailed identification of the property presented for insurance. This identification is preferably sufficient to establish the specific nature of the property and any structure to be covered by insurance. Additional information regarding the condition, surroundings, and construction of the structure, as well as past insurance coverage and claims made can be obtained as part of the detailed property disclosure. Thus, in a preferred embodiment of the present invention, the property identification is preferably obtained through a generalized set of questions, such as shown in Table II:

Table II – Detailed Property Description

	Question:
1.	What company provided your previous homeowners insurance policy?
2.	What was the policy number of that policy?
3.	What is your occupation (applicant's)?
4.	What is your spouse's occupation, if applicable?
5.	Will you occupy the dwelling on the property as your only primary residence within 10 days of inception of coverage?
6.	Does more than one family occupy the dwelling(s) on the property?
7.	Is there a thermostatically controlled heating system?
8.	Is there a Jacuzzi®/hot tub, spa or pool? If so, are they fenced?
9.	Is the dwelling more than 1,000 feet to a fire hydrant?

	Question:
10.	Is the dwelling more than 60 years of age?
11.	Are pressurized hot and cold water pipes copper?
12.	Does the dwelling have copper wiring on all circuit breakers?
13.	Does dwelling have smoke alarms?
14.	Is roof/dwelling well maintained in good condition and premises free of debris?
15.	Has insured reported any claim in the past 3 years? If yes, explain the type of loss and amount paid by insurer.
16.	Has any damage remained un-repaired from previous claim and/or any open or pending claim?
17.	Does the insured own or board any animals?
18.	Is the dwelling located in or near brush/forested area?
19.	Is the dwelling located in or near landslide area?
20.	Is the dwelling now or within the past 60 days been in foreclosure?
21.	Are abandoned, not operational, not regularly used vehicles, or company vehicles stored on the property?

The information collected through the detailed property disclosure is compiled 114 and associated with the user record as stored in the user database 64. In a preferred embodiment of the present invention, this compilation 114 of the property data is checked and supplemented 116 by accessing public databases 118. The information compiled by public assessors, which is often available electronically, contains property information, often including specific property tract metes and bounds, lot size, and easement data, structure information, including building age, construction type, zoning, and occupancy data. Other information, such as title and foreclosure status, can also be checked 116 and used to supplement the

detailed property disclosure information that is compiled 114 for a particular property.

Commercial services 120, 122 are available to be checked for particular information to complete the detailed property disclosure 112. These services may include a claims history database service 120, which allows the insurance and claims history for a particular property to be checked. Other services 122 may be accessed to check the credit worthiness of a particular applicant for insurance. The fees for using these commercial services are preferably charged to the insurance applicant through the execution of an e-commerce transaction with a credit card transaction clearing service. As before, the information obtained through these services, as well as the details of the credit card transaction are stored in the user database 64 in connection with the user record.

The information compiled 114 through the detailed property disclosure process of the present invention is quite detailed and substantially beyond, in many respects, the level of detail required by commercial underwriters for the conditional binding of an insurance policy. Conventionally, the binding is conditioned on an inspection of the property through a manual review of the relevant property records and, in many instances, an actual physical property inspection. This inspection represents a significant, though perhaps indirect, cost to the insurance carrier. While the present invention is fully supportive of the current underwriting practices in regard to the need for detailed property inspections, the present invention also supports a more detailed initial property evaluation that is capable of substantially if not completely eliminating the records review portion of conventional property inspections.

Thus, in support of current underwriting practices, the data compiled for a particular property, including the previously collected and model data converted hazard data sets, are submitted to an underwriting engine 126 to

formally qualify the target property and structures against the underwriting criteria of the insurance carriers known to the underwriting engine 126. The identity of the qualifying carriers and the compiled property information relevant to determining carrier specific insurance ratings for the target property is then preferably passed to the ratings generation engine 128. Conventional ratings qualifications, such as the presence of smoke detectors and sprinklers, the type of building foundation, and age of the structure, are evaluated in a conventional manner to produce insurance ratings for the property in respect to each of the identified insurance carriers. The resulting rating information is then again added to the compiled 114 property information. A formal quote from one or more carriers is then preferably displayed 130 to the client-user. Alternately, an explanation of why the target property is not insurable is displayed 132 to the client-user.

Where the substantially greater detailed information compilable by the present invention is to be used, potentially to reduce or eliminate the need for a manual property records inspection or, perhaps of greater significance, to greatly increase the accuracy and comprehensiveness of the property risk assessment and, therefore, the accuracy and reliability of the ultimate insurance rating of the property, a hazards re-evaluation 124 may be conducted using the full compiled set of property information obtained through the detailed property disclosure process. The hazards re-evaluation 124 preferably entails a resubmission of property and structure related data to the hazard engine 66. Thus, in comparison to the earlier presented example, the quake engine 70 is provided with more detailed information regarding the property and structure, which allows a more detailed modeling of the likely damage that will be caused by any particular level of shaking. The detailed information provided as part of the re-evaluation preferably includes whether the structure is of single or multi-story construction, the remediated age of the

foundation and structural shear walls, and the percentage or portion of the structure that may have been reconstructed by choice or building code requirement. This additional detailed information allows the quake engine 70 to produce a significantly more accurate projection of the maximum likely damage to the structure in response to a quake. Similarly, the compiled detailed property information allows the wind, fire, and flood model engines 68, 72, 74 to greatly increase their accuracy in projecting damages.

In accordance with an alternate embodiment of the present invention, the accuracy of the comprehensive risk assessment may be substantially increased by co-evaluation of the risk assessments produced by the individual hazard engines 68-74, in combination with the information provided by the support and qualification engines 76-86. That is, the probable maximum loss arising from any particular loss-event is preferably determined from both primary and secondary hazard events. The primary hazard event is considered to be the direct cause of the loss-event and is likely the direct source of the largest component of the probable maximum loss for the loss-event. In this embodiment, secondary hazards either caused by or occurring as a consequence of the primary hazard are also evaluated to determine corresponding secondary aggregate contributions to the probable maximum loss due to the loss-event.

This aggregating risk analysis can therefore provide a very accurate assessment of the risk exposure for a carrier in underwriting the insurance for the target property and structure. The specific performance of the aggregate risk analysis is highly subject to the detailed hazard assessment data produced by the individual hazard engines 68-86. Preferably, a rules based modeling system or other expert system is utilized to examine and evaluate different risk scenarios to determine different likelihoods of loss. Exemplary scenarios include:

1. Considering the potential loss effects of flood hazards combined with environmental hazards by evaluating the effects of different flood levels and flood circumstances on known environmental hazard sites based on proximity and elevation relative to a target property, thus permitting the identification and risk analysis of the potential and nature of any toxic contamination of the target site during flood events.

2. Considering the potential loss effects due to distant environmental hazards by evaluating topographical elevations, proximity, surface gradients, soil types, and geologic formations relative to a target property as the basis for determining the risk exposure to groundwater contamination in wells on the target property.

3. Considering the potential loss effects due to fault ruptures in combination with other ground failures, such as landslide and liquefaction, further potentially in combination with the proximity and nature of environmental hazard sites in the vicinity of the target property, thus permitting a comprehensive analysis of the loss risk due to any particular quake event.

4. Considering the potential loss effects due to the target property being exposed to multiple hazards, such as (a) both a brush-fire hazard and a ground failure hazard, thereby enabling evaluation of an enhanced potential for a landslide following a brushfire; and (b) fault rupture and fire hazards, qualified by building types, structure density, and proximity to brushlands or commercial/industrial structures, thereby enabling evaluation of an enhanced potential for an urban-wildland or industrial district conflagration following a quake due to broken gas utility pipelines.

The process operation 140 of the different levels of risk assessment provided by the present invention are generally illustrated in Figure 4. For current underwriting practices, here denominated a level-one analysis, the compiled data 114, including the previously generated hazard engine model

data converted data sets, is supplied directly to the underwriting engine 126. For a level-two analysis, the compiled data 114 is again provided to the hazard engine 66 for re-evaluation 124. The resulting detailed hazard descriptive information is provided to the model data conversion engine 90. Based on the different insurance profile criteria stored or accessible through the underwriting engine 126, the model data conversion engine 90 again develops model data converted data sets based on the hazard engine produced model data. These data sets preferably differ from the previously generated data sets in that they contain additional information that may at least be optionally considered in the operation of the underwriting engine 126 to determine the acceptability of the target property for underwriting. This additional information is also provided to and is more likely to be considered significantly in the operation of the ratings generation engine 128. In particular, the ratings generation engine 128 may utilize this additional information specifically in the process of identifying so-called insurance surcharges, which are represented as insurance premium add-ons used to adjust the base premium rate or rating for the property for specific characteristics of the property or structure to be insured.

For a level-three analysis, the hazards data produced through the re-evaluation 124, other compiled data, and model data converted data sets are made available to an aggregate hazard model engine 142. This engine 142 implements the rules-based or expert systems engine that performs the aggregate hazards analysis in accordance with the present invention. The aggregate analysis results is again provided to the underwriting engine 126, preferably in the form of the model data converted data sets and extended data that may be used by the underwriting engine 126 and ratings generation engine 128.

In connection with each level of analysis, the ratings generation engine 128 operates to generate formal insurance ratings for each underwriter considered. As generally illustrated in Figure 5, the process of obtaining ratings information may and, in preferred embodiments of the present invention, does involve accessing information from any of a number of potential sources. The determination of whether additional information is desired depends on the particular underwriters identified and knowledge of the different information access channels that are available to the ratings generation engine 128. Conventional insurance standard ratings schedules 152 may be locally accessible by the ratings generation engine 128. The ratings generation engine may be provided with access 154 to publically available ratings schedules, provided either by the different carriers or public agencies that monitor the activities of particular carriers. The ratings generation engine may also have access to third-party commercial services 156 that, through subscription arrangements both specific carriers and their agents and brokers, provide detailed digests of the ratings information for those specific insurance carriers. Some insurance carriers may also offer access to their own computer systems, specifically to obtain rating information, by supporting trusted middleware systems 158 or direct connections through proprietary interfaces 160. Finally, if not currently available now, insurance carriers may in the future provide their ratings schemes or schedules to qualified agents and brokers in a well-defined standard form, such as XML distributions, for use by their agents and brokers. These distributions 154 are preferably available electronically through repository sites or directly from sites operated by the different carriers.

Regardless of the particular channel used to obtain the ratings information provided by specific insurance carriers, the ratings generation engine 128 preferably utilizes the property identification, related data sets, and

any additional information provided, as in the case of the level-two and level-three property evaluations, to generate a corresponding insurance rating for the target property and structure. This information, as well, as the information generated from the underwriting engine 126, is compiled 114, stored in the user database 64 relative to the user-client record, and then presented as part of the formal quote display 130.

For the preferred embodiment of the present invention, the final binding process 170 for the target property is shown in Figure 6. From the formal quote display 130, the client-user is able to select a particular insurance policy for purchase 172. Upon confirmation of the policy selection and determination to purchase, a conventional online-credit transaction is initiated to obtain the funds necessary to secure the binding of the insurance. The selected carrier is notified 178 of the binding and provided with the corresponding application for insurance. Confirmations of the credit transaction, the application for insurance, and of the at least conditional acceptance of the application for insurance are then mailed or otherwise transmitted 176, such as by electronic-mail, to the client-user and insurance carrier. Finally, a hard-copy of the insurance policy will also typically be provided 180 to the client-user by the insurance carrier.

Thus, a system and method of providing for the comprehensive analysis of the risk exposure associated with a target property, and a system and method of autonomously evaluating the risks presented as the basis for the underwriting of insurance for those risks has been described.

In view of the above description of the preferred embodiments of the present invention, many modifications and variations of the disclosed embodiments will be readily appreciated by those of skill in the art. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described above.

Claims

1. A system, executable by a general purpose computer, of autonomously generating a site-specific insurability rating based on the hypothetical loss-exposure of a predetermined property, said system comprising:

a) a plurality of risk-modeling software engines that provide for the evaluation of respective property loss risk factors, said plurality of risk-modeling software engines generating model result data based on a site-specific description of a predetermined property;

b) a plurality of insurability profiles that define respective sets of predetermined loss risk-factor base criteria, each of said insurability profiles corresponding to an insurance source;

c) a model data conversion engine coupled to receive said model result data and operative to select a qualified insurance source, said model data conversion engine providing for the adaptive conversion of said model result data for comparison with said sets of predetermined loss risk-factor base criteria, said model data conversion engine selecting a predetermined insurance source where said model result data meets a the requirements of a corresponding set of said predetermined loss risk-factor base criteria; and

d) a rating evaluation engine coupled to receive said model result data and said predetermined insurance source, said rating evaluation engine providing for the autonomous generation of a site-specific insurability rating for said predetermined property based on said model result data.

2. A data processing system, executable by a general purpose computer, for assessing site-specific property risks in association with

determining a probable maximum loss as a basis for establishing an insurability rating, said data processing system comprising:

a) a hazards assessment engine implementing a plurality of risk evaluation models to generate a plurality of risk assessment data;

b) an underwriting discrimination engine including a plurality of insurability profiles established by respective insurance carriers, wherein said plurality of insurability profiles define predetermined acceptability criteria; and

c) a model data conversion engine coupled between said hazards assessment engine and said underwriting discrimination engine, said model data conversion engine providing for the autonomous selective filtering of said risk assessment data to identify instances of said insurability profiles where said risk assessment data satisfies the respective said predetermined acceptability criteria of said instances of said insurability profiles.

3. The data processing system of claim 2 wherein said predetermined acceptability criteria of a predetermined one of said plurality of insurability profiles presents a uniquely constrained definition of the acceptable risk assessment data necessary to autonomously satisfy said predetermined acceptability criteria and wherein said model data conversion engine provides for the autonomous interpretation of said risk assessment data to provide a closest match to said uniquely constrained definition.

4. A method of managing the autonomous, computer based evaluation of risks and costs of insurance for a predetermined property, said method comprising the steps of:

a) interactively obtaining an initial identification of said predetermined property from an end-user;

b) first establishing a preliminary risk assessment with regard to said predetermined property, said risk assessment determining a set of potential hazards to said predetermined property and a probable maximum damage rating for said predetermined property;

c) presenting said set of potential hazards and said probable maximum damage rating to said end-user;

d) obtaining supplementary information regarding said predetermined property;

e) second establishing a comprehensive risk assessment with regard to said predetermined property based on the combination of said initial identification and supplementary information through the automated evaluation of the exposure of said predetermined property to any of a plurality of loss-type events to provide corresponding sets of hazard model data;

f) first autonomously processing said sets of hazard model data against predetermined insurability profiles of predetermined insurance carriers to identify a qualifying carrier;

g) second autonomously processing said sets of hazard model data against said qualifying carrier to determine an insurance rating specific to said predetermined property; and

h) presenting said qualifying carrier and said insurance rating to said end-user for selection.

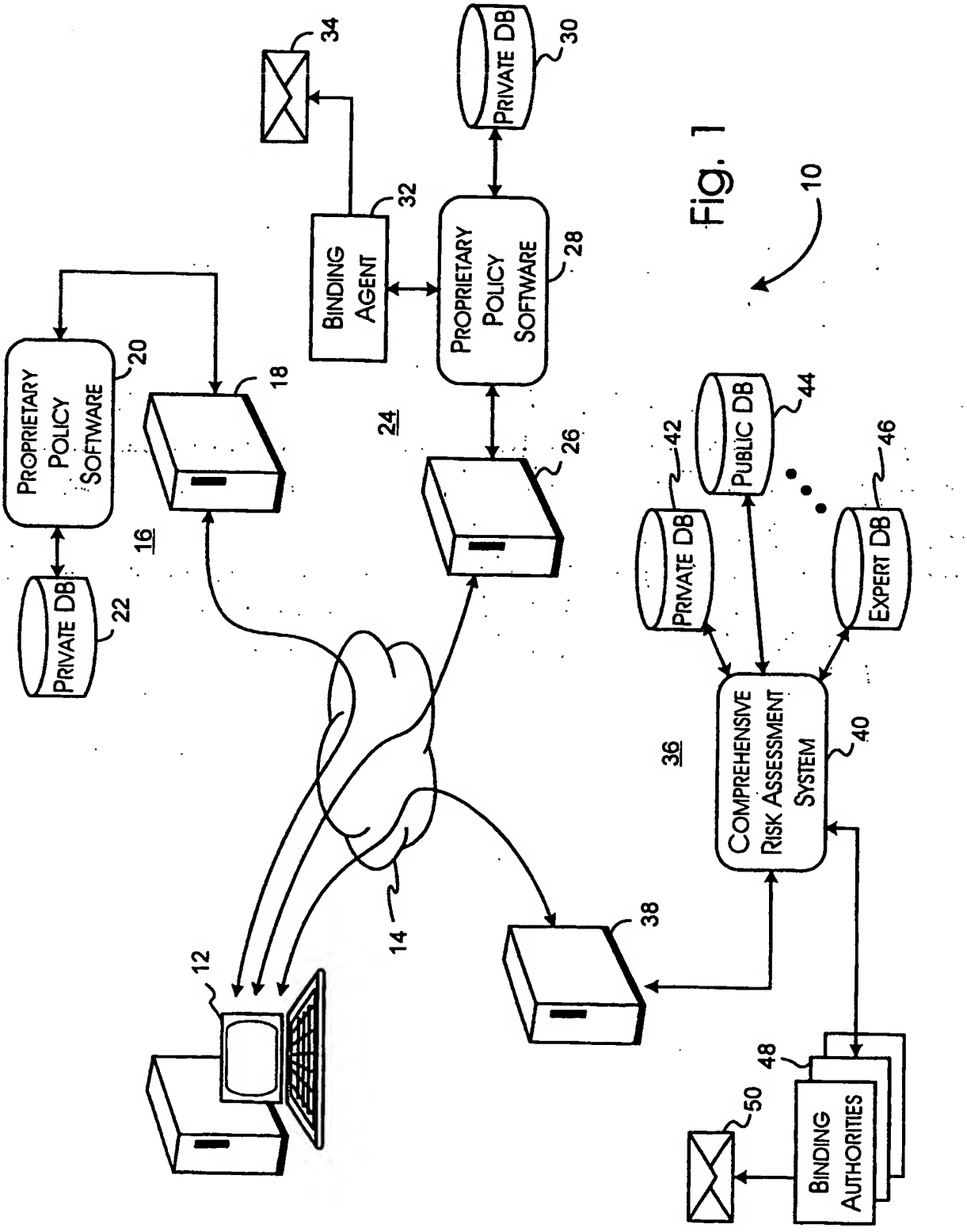
5. The method of claim 4 wherein said step of obtaining supplementary information includes the step of accessing, with respect to said predetermined property, an external database of property data to obtain data characterizing said predetermined property with respect to any of ownership, value, and construction information.

6. The method of claim 4 or 5 wherein said step of establishing a comprehensive risk assessment includes submitting said property identification and said supplementary information to a hazards assessment system including a plurality of hazard model engines wherein said property identification and supplementary information are utilized to identify the site of said predetermined property and evaluate the site-specific exposure of said predetermined property to a predetermined set of hazards.

7. The method of claim 6 wherein said set of predetermined hazards includes wind, quake, fire, and flood.

8. The method of claim 6 wherein said plurality of hazard model engines includes loss-event modeling engines, support data engines, and qualification data engines, wherein said support and qualification data engines provide site-specific information derived from said property identification and supplementary information to said loss-event modeling engines, and wherein said loss-event modeling engines provide detailed hazard model data.

9. The method of claim 8 wherein said first autonomous processing step includes converting said detailed hazard model data into data sets comparable with said insurance profiles.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32
BINDING AGENT
34
36
38
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COMPREHENSIVE RISK ASSESSMENT SYSTEM
42
PRIVATE DB
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PUBLIC DB
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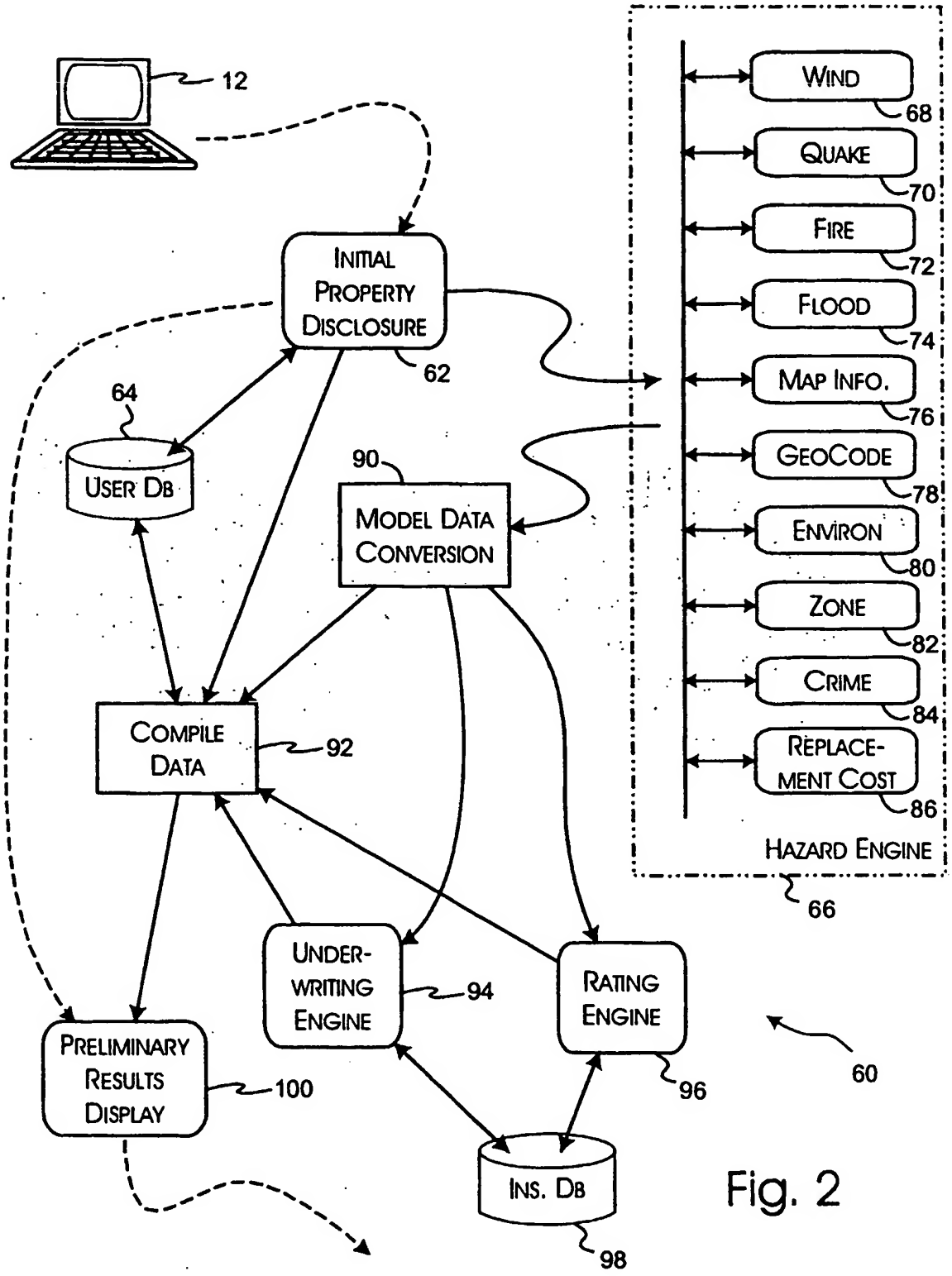
EXPERT DB
48
BINDING AUTHORITIES
50

Fig. 1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RATING ENGINE
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PRELIMINARY RESULTS DISPLAY
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INS. DB
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WIND
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QUAKE
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FIRE
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FLOOD
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MAP INFO.
76
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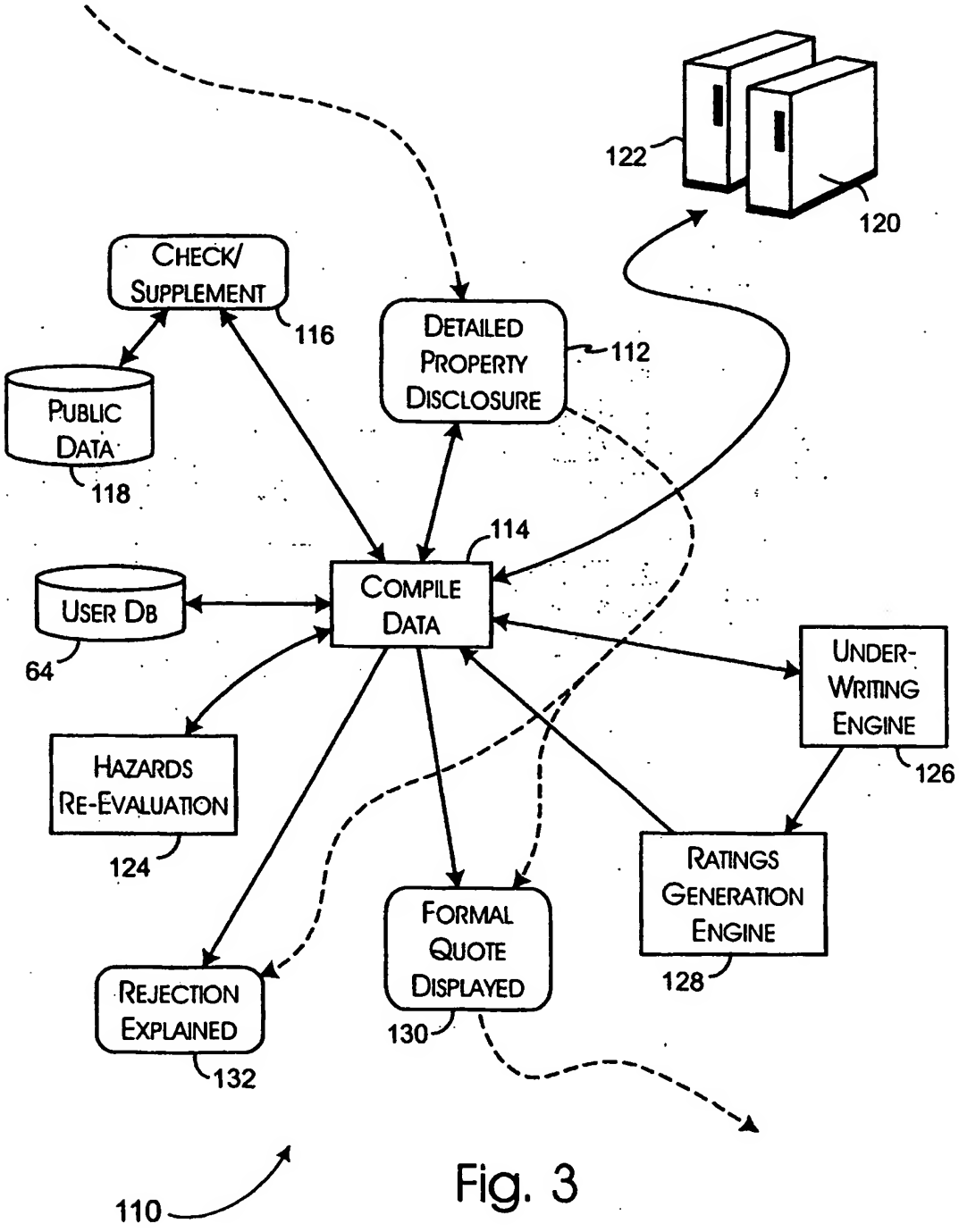
Fig. 2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RATINGS GENERATION ENGINE
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FORMAL QUOTE DISPLAYED
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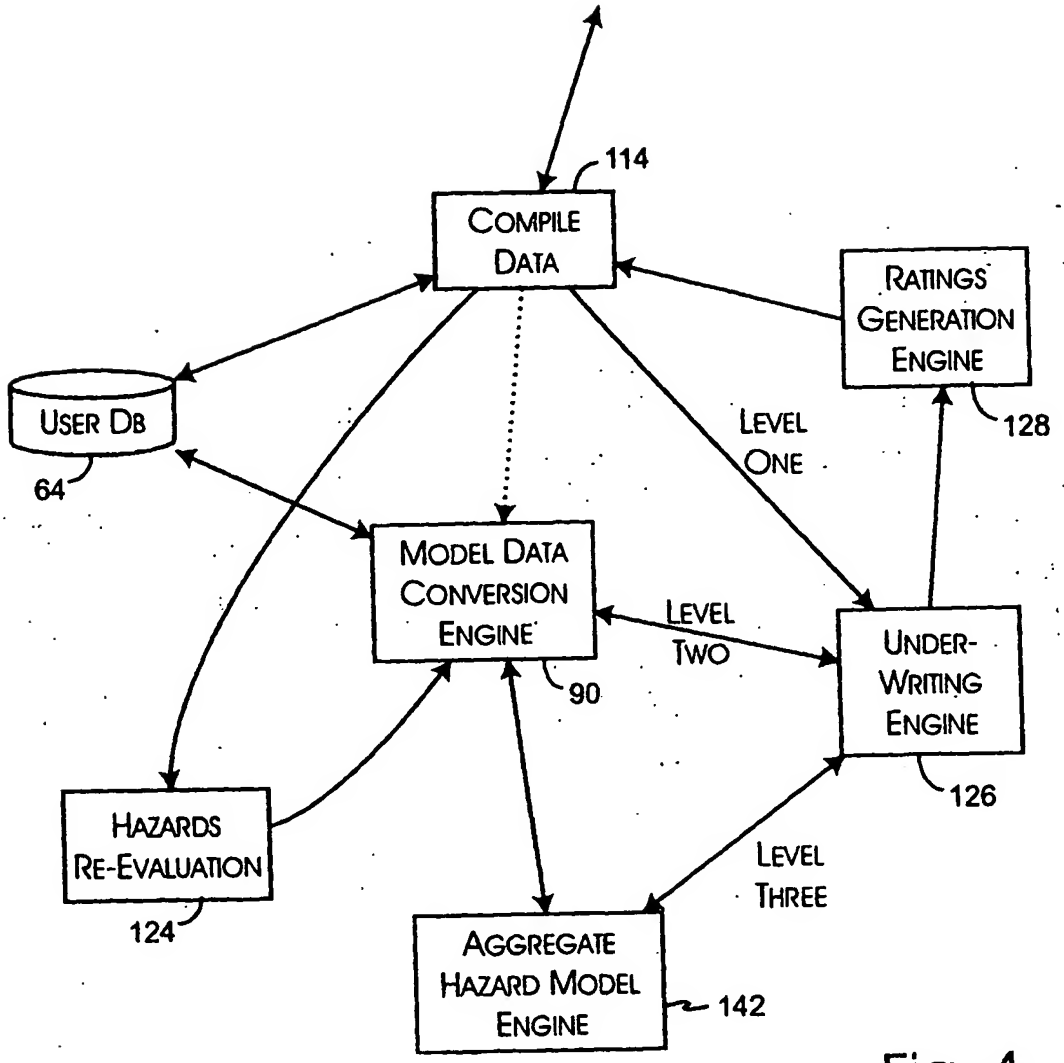
REJECTION EXPLAINED
132
110

Fig. 3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LEVEL TWO
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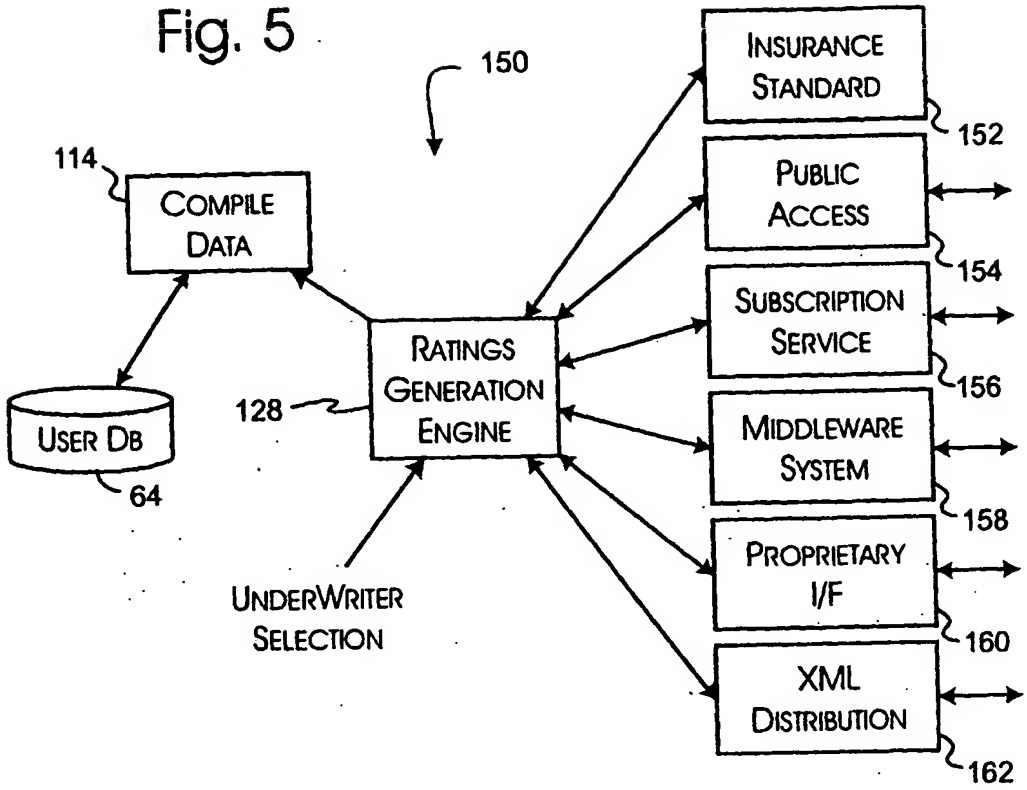
HAZARDS RE-EVALUATION
124
LEVEL THREE
AGGREGATE HAZARD MODEL ENGINE
142
140

Fig. 4

Fig. 5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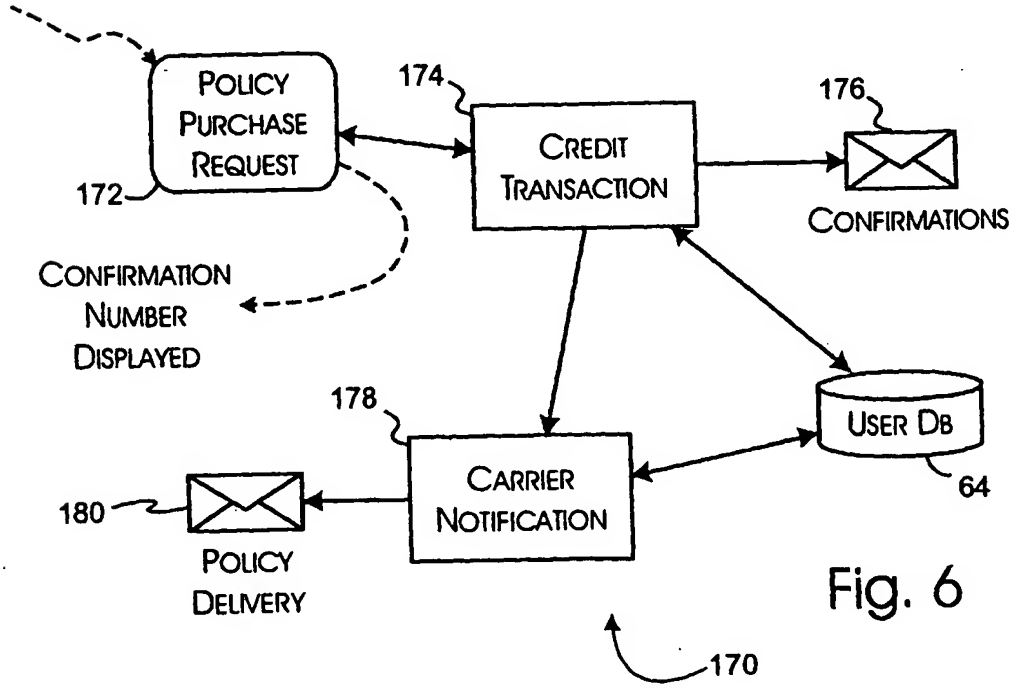
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POLICY DELIVERY
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Fig. 6